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GEOGRAPHY IN THE COLUMBUS, OHIO, QUADRANGLE.*

GEORGE D. HUBBARD.

INTRODUCTION.

The Columbus quadrangle (Fig. 1) includes an area which has had a long complex physiographic history, and yet today it presents very simple topography.

Paleozoic strata†, essentially limestones in the west, shales through the central part and sandstones in the east, underlie the whole area and are almost horizontally disposed. Subjected to stream erosion from the date of its uplift to the beginning of the glacial period, the region was apparently almost completely base leveled; and then the streams were rejuvenated, at least before Illinoian time, and young valleys were carved below the peneplain. During the glacial period at least two distinct ice invasions occurred and each modified the topography both by erosion and deposition. In interglacial stages, streams developed youthful valleys which were subsequently drift-filled. As the last or Wisconsin ice melted off, the present stream cycle was begun. In post-glacial time, the streams have carved several long narrow valleys with multitudes of short minor tributaries.‡

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†Ohio Geological Survey, Vol. 3, p. 599f. U. S. Geol. Surv. Folio 197.

‡A full description and discussion of the stratigraphic and physiographic history of this region may be found in Bulletin 14, 4th series, Geological Survey of Ohio, by the author in co-laboration with Drs. J. A. Bownocker and C. R. Stauffer.

The present stream cycle may be said to be in an advanced stage of youth, developed on a remarkably level till plain, which is varied in places by crescentic moraines and feeble outwash, kame and esker deposits.

Most of the quadrangle belongs to the prairies of the more nearly level type; but the Allegheny Plateau occupies the



Fig. 1. The Columbus Quadrangle in relation to Ohio counties. Columbus here shows as a Greek cross.

eastern margin, though its characteristic features are nearly concealed through the leveling effects of the drift mantle. An active, growing city, and a prosperous farming community with their transportation, manufacturing, and residence elements have developed and fitted down upon these physical features, until there exists today a good degree of adjustment and harmony of physical and cultural factors.

It is the purpose in this paper to point out these adjustments, the relations obtaining, and the influence operating between the physical and cultural features.

EARLIEST RESPONSES TO GEOGRAPHIC CONDITIONS.

Mound-builders, Indians* and the earliest white people to occupy this territory were attracted to it by the opportunities to hunt and probably, to some extent, to engage in a primitive kind of agriculture; but the real call to colonization, to settlement and actual occupation was a call which reached the people of the central group of the original colonies and led them to the level fields, fertile soils and occasional open prairie tracts for the purpose of fixed agriculture. It was easy to put the land under cultivation, for like most of the prairie it was not fully timbered, and only a part needed to be cleared before all could be turned over by the plow, and planted. So level, too, was the land that none was really waste, unless too wet; and communication either by canoe in stream or by wagon was easy in all directions. The timber along streams and over parts of the upland plains furnished all lumber needed for the quickly-built log houses, fences and stock shelters, and provided ample fuel for all early needs, but was not so heavy, dense or widespread as to depress the people or obstruct their progress in agriculture and intercourse.

The region early gained prominence because of the proximity to the Scioto and Olentangy rivers and to their junction near the center of the area. Further, its position, central in the Territory of Ohio, led to the selection of its chief town as the State Capital as soon as such a place was needed. This political asset in turn has ministered to the development of many interests in the region.

DEVELOPMENT IN HARMONY WITH ENVIRONMENT.

When once the farming and concomitant trading population was established in the region the favorable conditions for agriculture—moist temperate climate, deep fertile soils and river access to markets—encouraged the inhabitants to develop what they already had; and soon Franklin County which contains most of the Columbus quadrangle became known as one of the most prosperous agricultural counties in Ohio.

*Suggestions here and at several subsequent points have come from Prof. Frank Carney's papers on Ohio Geography in Bull. Den. Sci. Lab. 1910-11.

The abundance of limestone lying in plain view and very accessible along the Scioto River cliffs invited quarrying for building purposes; and the presence of wood made possible the burning of the stone for lime. Thus the foundations of two early industries were laid; the quarrying has persisted and grown to the present, but the burning of lime has long ceased because better lime could be made near by from rock of no value for building.

At an early date, also, waterpower was developed on the Scioto and Olentangy rivers and on the Darby, Alum and Walnut Creeks and even on some minor streams. Valleys narrowing and widening as they passed from rock to drift and again to rock, because they intersected buried interglacial valleys, formed tempting sites for grist or saw mills. Many more of these sites might have been used.

Springs, and good wells where springs were wanting, have furnished excellent waters which have made for comfort and health from the days of earliest settlement. These wholesome waters are possible because of the abundance of glacial drift both stratified and unstratified. A few in the eastern part come from the sandstones.

Communication and transportation early demanded attention because the till, especially when wet, made rather treacherous roadbed. The abundant glacial gravels in outwash, kame and esker deposits were used most extensively for wagon roads over the till plain until a few years ago when crushed rock sprang suddenly into almost universal use. The rock used for miles around the capital is limestone, quarried and crushed at various openings along the Scioto River within the area studied. Both gravel and crushed rock have been extensively used for railroad ballast also. By making use of these resources, here so abundant and near at hand, a much better roadbed is made than could be constructed of the other available materials, logs, planks, drift and cinders. In this instance again the more close the adjustment to the physical conditions—the more thorough the use of resources—the better it is for the people. And, again, the longer the people study the situation and work out their problem, the more they make use of their resources and become adjusted to the whole environment.

When the canal system was being constructed in Ohio, Columbus citizens desired water connections with Lake Erie and

with the Ohio River but the divide between them and the lake is high, hence neither of the through lines selected traversed the capital. One line did, however, come from Newark to Lockbourne and proceed southward to Portsmouth, and the Columbus people took advantage of one side of the Scioto flood plain for an easy canal route south to Lockbourne, as shown on the topographic* map. From that town, the main canal led down the flood plain about five miles, and then at a point where the river crowded close to the canal-(east) side of the flood plain the canal turned aside into an abandoned glacial overflow channel and continued southward out of danger from the menace of the river.

CULTURAL LOCATIONS GEOGRAPHICALLY DETERMINED.

Houses.—Outside of the towns the houses are usually placed with reference to some physiographic feature. A number are located on alluvial fans, partly because the fan furnished a little elevation above the flood plain, allowed better drainage or a more inspiring view than the lower plain, partly because it was desired to build at the junction of two valleys or two valley-determined roads.

Throughout the eastern sixth of the area many house sites were selected because of the proximity of a spring. Springs are common here, the water rising from the sandstones. Essentially all spring water is softer than well water from the drift, and it is always cool.

Along the Scioto, Olentangy and Big Darby a number of houses have been built upon rock terraces.† (Fig. 2.) These afford pleasing outlooks, and a residence far enough above the flood plain to be out of danger of floods yet not as far away from the flood plain fields as would be a residence back on the upland. A spring at the rear of the terrace has given some terraces an advantage over others, and some parts of large terraces over other parts.

Bluffs overlooking the flood plain have proven very attractive to both Mound-builder and Caucasian. At Arlington, west of Columbus, the best residences fringe the bluff from the Marble

*At this point and many others the readers will find it advantageous to have at hand the four local topographic maps published by the U. S. Geol. Survey and the physiographic maps in the folio No. 197 and the Ohio Survey Bulletin 14, mentioned in the opening paragraph.

†Ohio Nat., Vol. IX (1908-09), pp. 397-403.

Cliff station on the Pennsylvania Railroad south and east for two miles. Even the car from the city to Arlington is called the Grandview car. North of Columbus for two or three miles along the pike on the east Olentangy bluff there is being built a beautiful residence section. (Fig. 4.) In the city much more attention has been paid to the æsthetic in house location during the past ten years than ever before.

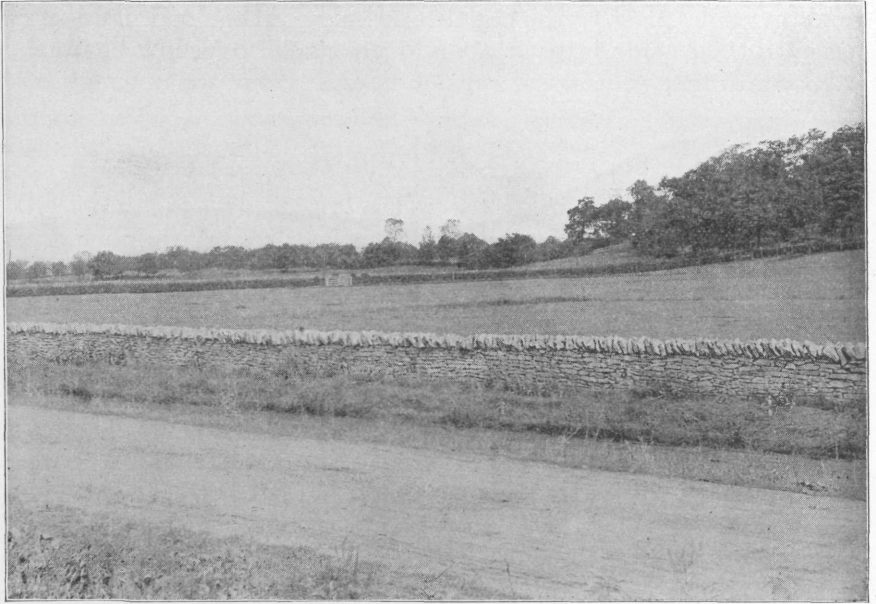


Fig. 2. The rock terrace at Marble Cliff in the Scioto Valley. This level stretch, many acres in extent, stands some 50 feet above the river level and at least an equal distance below the upland. Looking nearly north.

Over very much of the area even outside the specific moraine belts are strewn moraine hummocks, little swells in the till plain. Literally hundreds of farm and village houses are built on these hummocks. The slightly greater altitude gives better outlook and better drainage than has the plain in general. In a few instances, an esker ridge has furnished a place attractive enough for the farmer builder.

Railroads.—North of Columbus in the central part of the area four railroads connect the city with Toledo, Sandusky, Cleveland and intermediate centers. The Hocking Valley, on

the interstream strip between the two major streams, climbs from its flood plain station in the western part of the city, up the bluff obliquely for seven miles until it emerges on the upland, and then almost immediately plunges into a deep cut with ascending grade through the Powell moraine to a still higher inter-morainal till plain beyond the town of Powell. Two engines are employed to pull nearly every freight train this far out from the city. Where the road is well up on the interstream area it swings away from the main stream beyond the head ends of the little fringing tributaries bordering the Olentangy River. This is done to find a more nearly level course and to avoid building so many bridges.

The Big Four, Pennsylvania and former Cleveland, Akron and Columbus, now a Pennsylvania line—the other three roads to the north—leave the Union Station on the east bluff of the Scioto River; hence do not need to make a climb but at once strike out on the interstream till plain. (Fig. 3.) The first and second are essentially parallel as far as the northern boundary of the area with no curves, bridges, cuts or fills, because they are so far from the major streams that the till plain is still undissected. (See topographic map.) One small bridge over a stream while still really within the city, and a slight grade south of, and a shallow cut through, the Powell moraine constitute the only exceptions to this generalization. If it were not for this adjustment—if, for example, the route of either railroad had been laid out one to one and one-half miles nearer the Olentangy stream—thirty-five to forty bridges would have been necessary with almost continuous cutting and grading. No road follows either of the four valleys north from Columbus because the interstream areas afford a much more practicable route.

All the roads east, south and west lie on the level till plain paying no particular attention to valley or stream, because none is far below the till plain. No railroad out of Columbus follows a valley even for a short distance, except the Pennsylvania, the Toledo and Ohio Central, and the Big Four west for two or three miles, and the Hocking Valley and the Toledo and Ohio Central south for an equal distance. In all these cases, exit from the valleys is made as quickly as possible in order to use the level upland till plain. Not only do the roads out of the city avoid the valleys but over the whole area no railroads can be found in valleys at all.

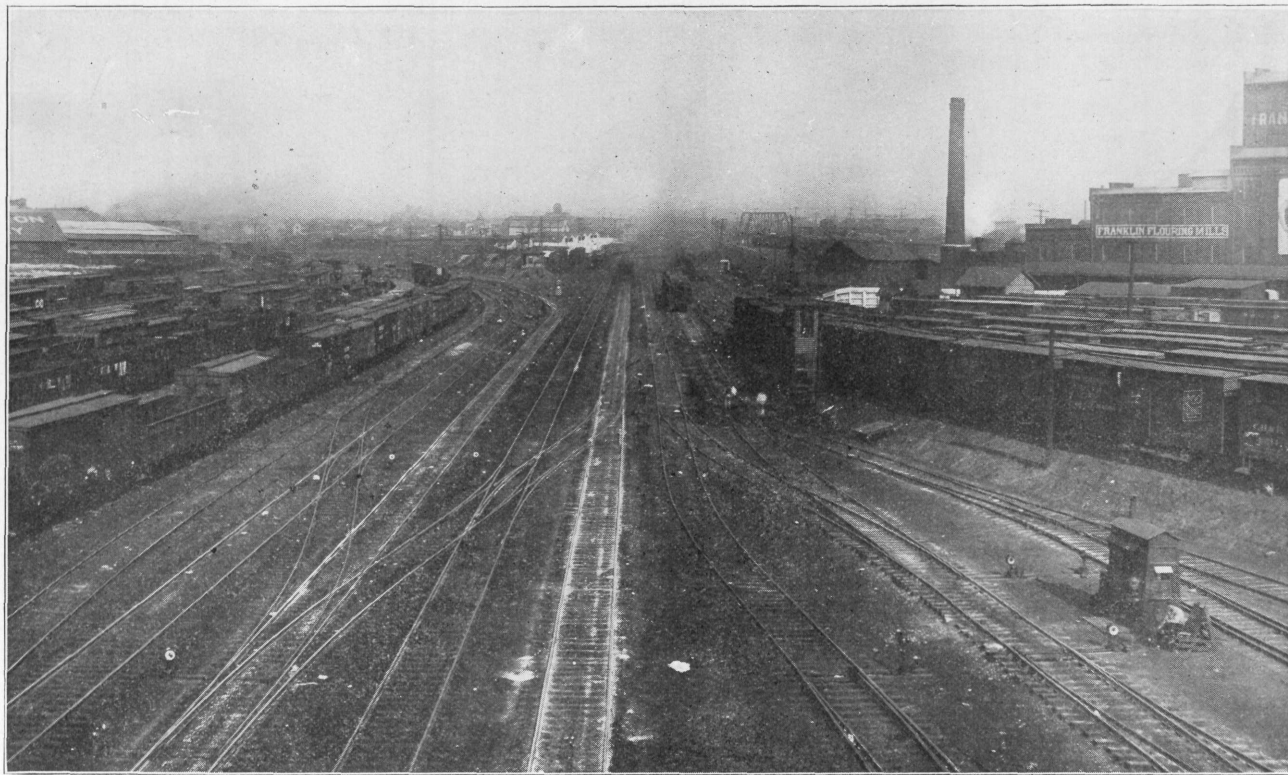


Figure 3. Railroad yards as seen looking east from Fourth Street elevated bridge. All roads but one have direct access to these yards, which spread over the level till plain and touch the wholesale district.



Figure 4. Looking east from a point on the uplands west of the river across the Olentangy. Hundreds of residences have been built over this rising slope, taking advantage of the beautiful westward outlook and the clear air from across the valley.

Railroad Bridges.—The valleys are often so narrow in this area that the railroads cross on bridges supported on tall trestles. The Baltimore and Ohio over Big Darby Creek at Harrisburg has a bridge 90 feet high and about one-fourth mile long. (Fig. 5.) The Pennsylvania crosses the Scioto River at Marble Cliff west of Columbus on a high bridge and leads up a long rock terrace slope at the east end of the bridge to gain sufficient height for the crossing. (Fig. 2.) The Cleveland, Akron and Columbus crosses Big Walnut near Sunbury on a bridge high enough to be flush with the till plain, and the Baltimore and Ohio crosses Black Lick at Black Lick station in precisely the same manner.

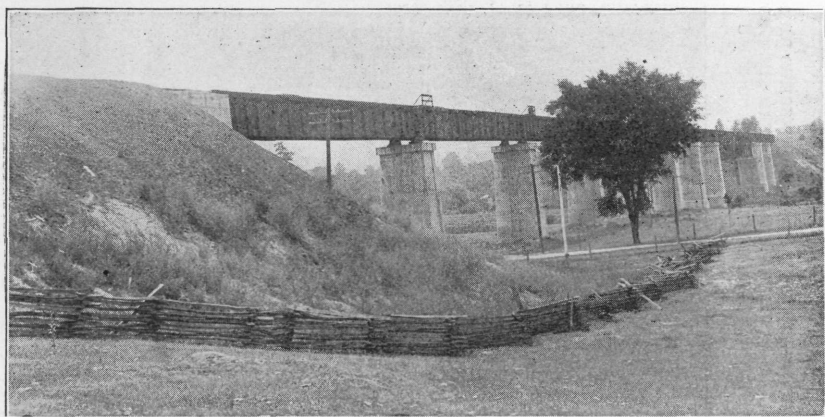


Fig. 5. Bridge of Baltimore and Ohio railroad over Darby Creek at Orient. The track dips but little to make this crossing. Such a high level bridge is possible because the valley is in the youthful stage, and advisable because the valley is so deep.

Alluvial fan slopes are sometimes used by the electric railroads in getting out of and into a valley. The Arlington-Grandview car so ascends from the Scioto flood plain across a fan and up a little ravine to reach the upland till plain. All these harmonious adjustments of railroads are responses of the cultural to the physical.

Wagon Roads.—It is probable that as many examples of wagon road adjustment could be found as of railroad responses. Many roads were laid out in "bee-line" from Columbus to the neighboring towns, in order to facilitate communication between them. Parallels and meridians are occupied by a few roads;

but many miles of road are directed by streams or valleys. The Scioto River is followed by one road all the way from Columbus to the northern limits of the area and frequently by two for short distances. Similar response is found along the Olentangy River. Alum and Big Walnut valleys have proved sufficiently influential to have at least one road follow each most of the distance across the northern half of the area, but the road is upon the till plain a portion of the way. The valleys are crooked and streams more so, and the latter crowd closely under one bluff then under the other necessitating many bridges if the valley floor be followed.

Wagon Bridges.—Over most of the smaller streams wagon bridges have been built where the fords were formerly, or so near, that obviously the ford crossing and its road connections determined the bridge site; but this is not the case with many of the larger bridges. Often narrow places, or sites with rock banks on one side or both, or specially good drift or gravel banks have been sought out for bridges, just the conditions that were avoided when the fords were located. This has necessitated the laying out of new roads and the construction of crooked, indirect roads across the valleys in many places. The bridge over Big Darby, midway between Georgesville and Harrisburg, and the upper bridge at the latter place are good illustrations of this principle. The bridge is located at a desirable place with reference to the stream, but where considerable circuitous driving is necessary to use the bridge. So common is this kind of response that a bridge, so placed as to make the road straight across the stream, and continuous with roads on opposite sides, is a rather rare feature in the area.

In many places the suitable crossing, whether ford or bridge, and particularly if a bridge, is approached by several roads. A convergence of three, four and even five roads from one side of the bridge and a corresponding divergence on the other side is a frequent occurrence.

Quarries.—Many opportunities are afforded by the physiography for access to the rock. Valleys are youthful and deep enough to have been cut well into the rock. The steep-sided valleys of the Scioto and several of its tributaries, and of the Darby creeks are, in more than a score of places, the sites of limestone quarries. Several old quarries are found south of

the Scioto, where it runs eastward, west of Columbus. Four or five more newer and much larger ones are located just north of the Marble Cliff bend; and then a series of lesser quarries, some old and some new, occupy favorable sites from these larger ones northward even to the northern boundary of the area. Not only have the streams carved deep cuts into the rock and thus accomplished all the preliminary work of opening, but they have cut so deeply that large quarries can be worked above river level with no fear of water to trouble the workmen.

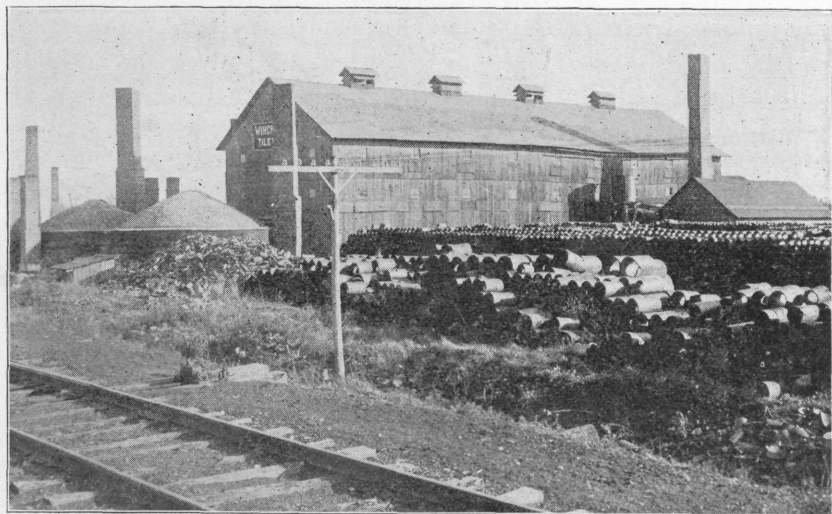


Fig. 6. Drain tile plant situated near Black Lick, because the soft Bedford shales are here available.

Another item which makes quarrying easy is the fact that the glacier, scouring over this region removed nearly all partly decayed rock, leaving the fresh solid limestone, shales and sandstones at the surface; and again as the larger streams have made their valleys they have removed nearly all drift that the glaciers left, on these future quarry slopes.

In the northwest portion of the area preglacial interstream ridges of limestone are so thinly mantled, and so thoroughly cleared by the glaciers of their partly weathered rock, that quarries have been opened in them without the aid of the rivers.

Just as the streams and glaciers have prepared easy quarrying of the limestones in the western half, so in the eastern half of

the area the same agencies have made sandstone quarrying easy. The sandstone is not nearly as good of its kind as is the limestone.

Brick and Tile Plants.—The softer beds of the Devonian shales are exposed in several places and have determined the location of a sewer pipe plant in North Columbus and a brick and tile plant on East Fifth Avenue. Both factories find a large local market and do an extensive business. With the development of the brick industry on an abundant natural resource, and with the exhaustion of the timber has come a change in the kind of buildings from frame to brick houses. There should be much less of the former type of construction and much more of the durable limestone and brick construction in Columbus, and undoubtedly this adjustment will continue. A brick plant and a tile factory are located at Taylor's, some nine or ten miles east of Columbus, where the purple and red soft Bedford shales come to the surface. Another tile factory at Canal Winchester uses the same Bedford formation (Fig. 6). No factories of these kinds occur in the western part of the quadrangle, because the suitable shales are wanting. Several minor tile- and brick-making establishments are using the glacial drift. Some take it directly from the till plain, others are drawing from glacial kettles which have been more or less filled with clay during post-glacial time. Some plants using the drift are located at Pickerington, in the south part of Columbus, near Greencastle and near Hilliards.

Tile for draining the nearly level till plain finds considerable market over most of the area. Thus the needs, purely geographic, is readily supplied by using natural resources already in place when the need arose.

Sand and Gravel.—Sand for building purposes and gravel for wagon and railroad beds are abundant. Outwash deposits occur in and around Columbus and southward in abundance. Others are found along the streams north of the city. Eskers in North Columbus, Pickerington and southwest of Canal Winchester, and kames south of Columbus at Bakers and Spanglers Hills furnish much gravel, easily available. The Hocking Valley railroad company has built a spur to Bakers and expects to remove the whole hill. The demand for both sand and gravel is great in recent years in the building trade,

and a company has thereby been called into being to dredge the Scioto River in Columbus, through which great quantities of both sand and gravel are supplied to the local market.

Diversified Agriculture.—In the early part of the agricultural history of this region, general farming was the rule, but it has now been recognized that most of the land is better suited to some one class of farming than to others*. Certain uplands are given over almost entirely to timothy hay, or to pasture. Many small stream floodplains are now used for pasture alone, because they are too wet in most years for cultivation. Large

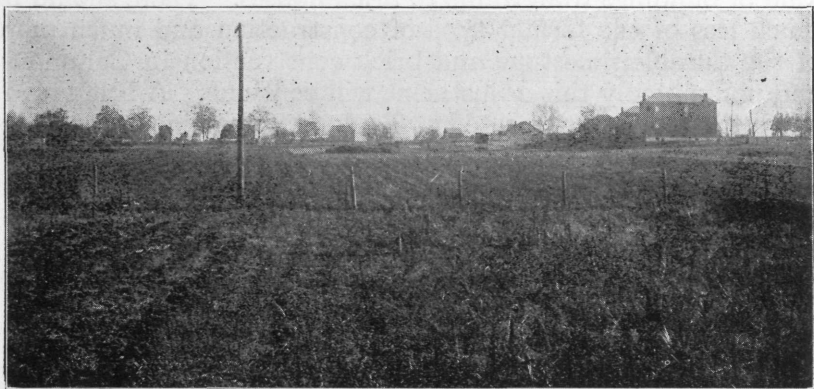


Fig. 7. Alluvial tracts southwest of Columbus adapted for and devoted to truck farming.

flood plains have been leveed and with the terraces or second bottoms are repeatedly planted to corn. A rotation of oats, corn, wheat and clover or alfalfa is used on many upland farms, for without a rotation any one of the grain crops soon fails. Some cold, heavy, upland fields are put into buckwheat, a crop especially adapted to such soils. Orchards and fruit have been put upon many well drained slopes. This is particularly true near Columbus, where fruit markets are largest.

A lake bed of about forty acres, four and one-half miles south of South Columbus, is devoted year after year to onions. The soil is especially adapted, being black with organic matter, rich, loose and warm. Many other similar tracts, though rarely so large, could be thus used for onions or celery. Around

*Map 20, Columbus sheet. Bur. of Soils, Rept. Field Operations, 1902. Map 30, Westerville sheet, *ibid.*, 1905.

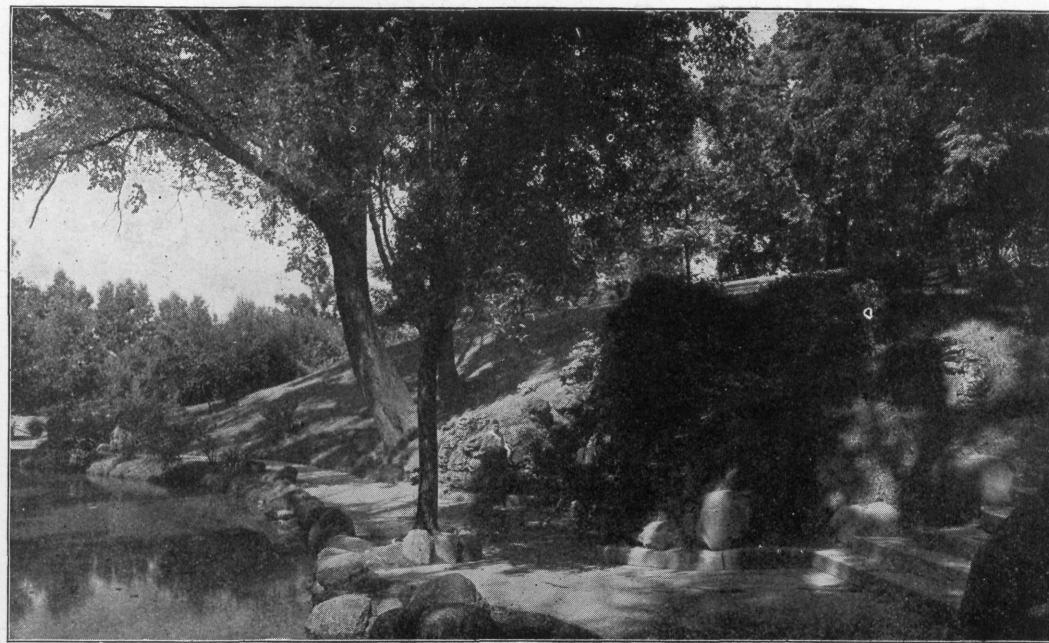


Fig. 8. The State University Campus spring from outwash gravels and sands beneath a thin capping of till. The stones are boulders and blocks of limestone transported to the spring to enhance its beauty.

Columbus and particularly southward are hundreds of acres devoted to intensive gardening. This is partly a response to the call of the market, but the specific location of many of the gardens is determined by the fertile, alluvial, deposits of second bottoms south and west of the city (Fig. 7). Here and north-west of Columbus are the two most favored gardening sections. North and east of town this specialized phase of agriculture does not occur, although all conditions but soil are probably as suitable, as in the two sections used.

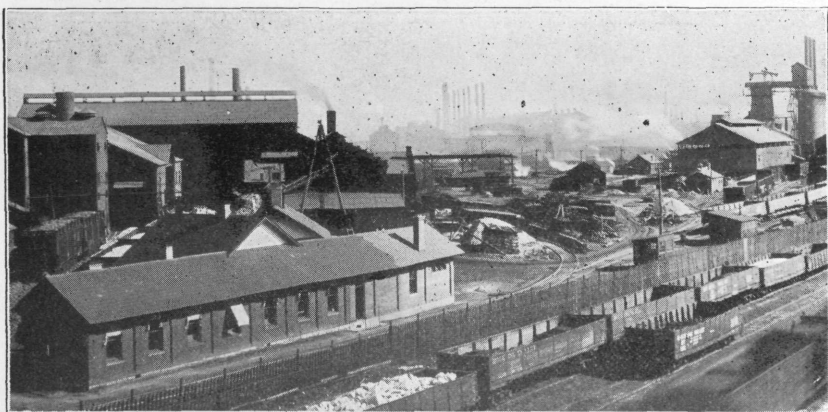


Fig. 9. General view of the steel plant at South Columbus, at intersection of three railroads.

Windmills.—Over most of the western half of the area the drift is deep and wells range from 50 to 150 feet in depth. In response to this combination, hundreds of farmers have erected windmills to pump the water. Winds usually move over this level country with force enough to do the pumping. Occasionally the deep well seems to necessitate the installation of a gasoline engine, because the wind is scarcely able to do the pumping.

In a strip four to eight miles wide along the eastern part of the area, springs from the sandstone are so common that wells are rare; and wells, when needed, are so shallow that windmills are still less common. The spring-house, however, and the roadside watering trough are constant reminders to the traveler of the different conditions. Springs also occur in the gravel streaks of the glacial drift (Fig. 8).

INDUSTRIES LACKING GEOGRAPHIC REASONS FOR LOCATION HERE.

A few examples of industries in which adjustment cannot be made, may profitably be mentioned. In such a city and community large quantities of cement are used and one might think a cement plant would be built here, but the natural resources limit the project. The limestone is not suitable for cement, and no suitable clays exist within many miles. Hence all cement must be shipped in, thus establishing geographic connections with a broader environment. The iron industry is rooted here in South Columbus (Fig. 9), but there is no element to encourage it beyond the local market and good flux limestone. Further, the plant sells but very little product in Columbus. Coal and iron must both be hauled many miles. While so much coal mining is financed from Columbus in the Hocking Valley and other districts to the southwest, that coal mining is considered the largest single business in Columbus, not a particle of coal is actually mined anywhere within the quadrangle. The iron ore for the iron and steel industry comes by way of Toledo from Lake Superior iron mines.

A glass factory is running in the eastern part of Columbus, with quartz sand from Toledo and gas from 30 miles southeast. Market, labor and transportation facilities are about the only favorable conditions for this industry. No industry making heavy demands on lumber has located here, because of the natural scarcity of timber. Limitations of this sort are put upon many lines of manufacturing.

THE GROWTH OF COLUMBUS.

Starting on the grounds formerly selected and used by the Wyandotte Indians for a straggling town, the village of Columbus began to take shape along the east bluff of the Scioto River one half mile to one mile below the mouth of the Olentangy. At this place the ground is high and gravelly, affording good drainage and in general much better conditions for building than most places near by.

Nearly parallel with the general direction of the Scioto and Olentangy, along the slight elevation at the crest of the bluff, very appropriately came High Street (Fig. 10). And in distinction from many shorter streets leading eastward, one was called Long Street. Broad Street was laid out wider than



Fig. 10. Business center on High Street. State House on right, and grounds in foreground.

any other, hence its name. The intersection of High and Broad streets, both leading far into the country, became the chief center and the State House corner. This pre-eminence was further augmented when Broad Street west became the national pike and High Street north the Columbus-Sandusky pike. Main Street lies along the national pike east and early became a leading street. Because of the relation of High Street to the river, and of the relation of the two leading streets to the incoming pikes, the town has pushed out in four directions, making a great Greek cross, (Fig. 1); and not until quite recently has there been much filling in of the corners. Ten or twelve years ago Columbus reached seven miles north and south and almost seven miles east and west, with an area of scarcely twenty square miles and nearly two of these bare flood plain.

The older manufacturing plants, such as the carriage factories and shoe factories were located in the heart of town, in order to be in touch with river, canal and later the first railroads. Of course they still remain there and enjoy these locational privileges. Several later plants, as the Kilbourne-Jacobs and Kinnear machinery factories, and the Pennsylvania railroad shops and some of the State Institutions have been built up on the periphery of the old town, the former along the railroads, the latter on the attractive streets, east, north and west. And now, a later chain of manufacturing plants has been swung around the recent city three or four miles from the center and along the railroads;—the steel plant (Fig. 9), starch factory and fire apparatus factory on the south, where the Hocking, Toledo & Ohio Central and Norfolk & Western railroads part company; the lithograph company, at the intersection of the Big Four and Fifth Avenue east; foundaries, machine shops and cold storage and butterine plants along the west side of the north arm of the city on the short spur from the railroad yards just north of the mouth of the Olentangy. The asylums for the insane (Fig. 11) and the feeble-minded stand on beautiful sites on the Scioto bluffs far out in the western arm. Many other plants owe their general location away from the center to their late arrival and the crowded condition of the business district; and their specific location to the intersection of two railroads or to some other transportation facility.

The presence of the manufacturing district in the northeast corner of Columbus has prevented the spreading of the residence section into that corner until recently; and now, in the last five years, there has been a phenomenal growth between the factories and shops of this corner and the State Fair Grounds. This recent growth has occurred also still farther northeast beyond the Fair Grounds and the State University. Alum Creek also served as a temporary barrier for many years on the east, but these same recent years have seen a great expansion



Fig. 11. State Asylum for the Insane. The flood plains below are used for gardens, the wooded slopes for walks and the level upland for the buildings, drives and lawns.

beyond that stream over the till plain for a mile and a half east, and for three miles north and south. Likewise there has been added to the city about four square miles of residence blocks in the southeast corner of the Greek cross. This tract was wet and undesirable for city lots, was poorly drained, untouched by street car service which for years had been confined very closely to the four cardinal arms of the city and was far from much of the business and manufacturing. But with the establishing of factories and mills even beyond this district, and the

crowding from within the city business section, the necessity of improving this 4-mile tract has been forced upon the city; and now much needed improvements have come, beginning with thorough draining, the paving of the main thoroughfares (the old country roads) and the building of car lines along several of these established highways.

In a similar manner, and by almost the same steps, the northwest corner, Marble Cliff-Arlington district, is now filling in. As stated above, the Scioto bluff in this section has for many years had a fringe of comfortable looking residences and club houses located with reference to the "grandview" to the south and west; but the less attractive till plain is now well drained and taken up for residences, stores, school houses, and offices.

Probably, however, the most attractive residence section now being built, is along the Columbus-Sandusky pike north. This road, now completely rebuilt and in excellent condition to keep pace with its surroundings, skirts along the Olentangy east bluff and is followed by the Columbus, Delaware and Marion electric railroad. Now for fully two miles cross streets have been laid out leading up the beautiful west-facing bluff; and hundreds of houses have been built. (Fig. 4.) Clintonville, almost five miles north of the Union station is now structurally a part of Columbus.

The city is, in a large way, a manufacturing, commercial and mercantile city and thus a product of the influence of the geographical conditions. As pointed out, transportation has from the start been easy, and now the many radial lines of steam railroad, electric railroad and pike are very influential in the growth of the city. The fine farming lands, calling for a numerous, active, well to do agricultural population, have been responsible for the great development of manufacturing of buggies, wagons, shoes, and other leather goods, farm machinery, iron and steel goods, and for the growth of the meat-packing, tile-making, and many other industries. Further, the coal, oil, and gas, and limestone nearby have called for manufacture of well-drilling, mining, quarrying and electric apparatus. And with the growth of these industries, have come subsidiary, dependent or related industries in considerable numbers as in any other city.

Influence of State Institutions.—While so much is in large degree a response to physical conditions here before the town came at all, and is a measure of the adjustment already accomplished, no small importance must be attached to the location of the State Capital, the State University, and a half dozen other State Institutions in and about the city. But since these came partly because of the opportunities already offered and are now a part of the geographic environment, they may be considered among the geographic factors aiding in the growth and importance of the city. They each bring many workmen, skilled and otherwise, whose homes are a part of the residence districts, and whose expenditures add a large item to the business of the city. Not only through their employees but directly



Fig. 12. Drives, shade and conservatory in Franklin Park. Sags and swells of moraine may be seen among the trees on both left and right.

through their own maintenance do these institutions each contribute to the importance of the city. Further, most of them owe no small part of their size and usefulness to the fact that they are in the midst of a large, growing, prosperous community.

Parks and Drives.—Columbus has taken advantage of but little of its natural beauty and attractiveness in its park and drive system. Two parks in the thickly settled parts of town and the U. S. Barracks in the midst now of a manufacturing district constitute all that could be called park until the outskirts of the city are reached, and all these lie on the exceedingly level uninspiring till plain. Franklin Park on the eastern border along Alum Creek is part flood plain and part till plain, with a rolling somewhat sandy intermediate zone of charming country suitable for drives, shrubbery and flowers. Some use of

of this tract is already being made. (Fig. 12.) The stream itself is not made use of, and its borders within the park are essentially waste. Broad Street (Fig. 13) and Bryden Road (Fig. 14), shady well kept residence streets, connect the park with the business district. At the west end of the city, two State Institutions, the Asylums for the Insane and for the Feeble-minded have spacious green and shade areas lying over the definite bluffs of the Scioto and on both the till plain above and the flood plain below. (Fig. 11.) Neither reaches the river. They



Fig. 13. East Broad Street. Fine residence properties and splendid drives on the even till plain.

are not in any sense public parks, yet in some respects they serve that function and might be greatly beautified by taking advantage of more of their geographic setting.

In a similar manner the State University grounds (Fig. 15), well north in the city, lie over the bluffs and upon adjacent upper and lower plains along the Olentangy River and a small tributary ravine. A very little effort has here been made to use natural beauty by restraining the waters of a group of springs for a lake, and limiting their flow to one large spring bowl. Not half as much has been accomplished as might be to make attractive a really pretty natural site. A private company has



Fig. 14. Bryden Road, the better residence part of East Town Street.

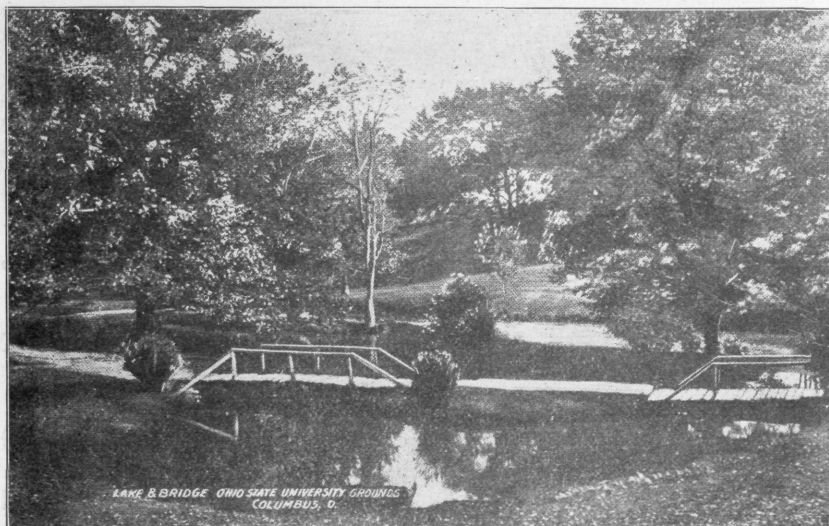


Fig. 15. A beauty spot over the bluffs of a little ravine tributary to Olentangy River, now a part of the State University Campus.

selected a beautiful place at the northern limits of town, on the Olentangy River and a tributary ravine, and has there built up an amusement and picnic park. Much has been done to make the site over the slopes attractive by buildings, walks, stairs and seats. A suggestion is here given of what the city might do.

East from this park, up the ravine about a mile, the glen, here possessing a small flood plain, is now used for a park. Paths and seats, with rustic bridges over the stream and a well or two constitute the chief improvements but they are sufficient to draw the public to the pretty site for picnics and pleasure walks. No true boulevards are to be found at Columbus.

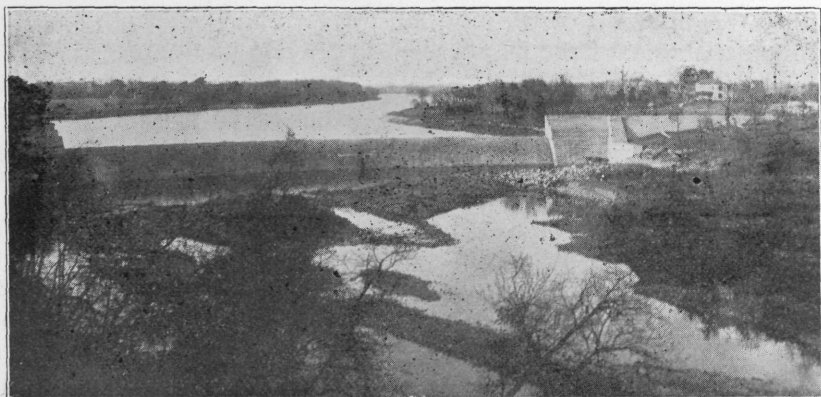


Fig. 16. Concrete Storage Dam, which retains 1,000,000,000 gallons of water in the Scioto gorge. Built where the youthful gorge narrows suitably.

City Water Supply.—For many years the shallow well system of water supply was used in Columbus as in the country districts around, but finally the waters of the Scioto River were drawn upon, and a city waterworks plant was put into operation thus laying under control another item in the environment. This was, however, surface water, hard, variable both in supply, and in freedom from mud, and always open to contamination from a thousand upstream sources. The Scioto valley, while essentially a rock gorge across the entire northern half of the quadrangle, and narrow enough to be effectively obstructed by a large dam, is wide enough to make a very satisfactory reservoir. About twelve years ago the city council decided to take another step in the adjustment to the physiographic conditions by building a massive concrete dam across the river. (Fig. 16.)

The site selected was six miles above the city, at a place where the valley walls were fairly close together, and above which the valley widened a little. The dam was built on solid limestone all the way across and set into limestone bluffs on each side. Rock removed to build approaches and abutments was crushed and used in the concrete construction. When completed, the dam was high enough to pond the water back for fully four miles or almost to the Dublin bridge. The mouths of little tributary gorge valleys and several little quarries were drowned. The old Dublin road had to be raised or reconstructed 50 to 100 feet higher up the bluffs. This improvement with a large filtration, softening, and pumping plant most admirably situated near the junction of the two large rivers has put Columbus in touch with one of the best water supplies to be found.

Natural slopes toward the Scioto River from all parts of the city, and the great gravel and sand beds south of the city for settling tanks and filters have been taken advantage of in the construction of a sewage system and disposal plant.

Floods.—The young valleys of the Scioto and Olentangy rivers with their considerable drainage basins above are subject to floods of devastating dimensions. Nearly every spring a moderate flood arrives at Columbus, and in years with exceptional combinations of circumstances the quantity of water becomes alarming. The valleys above the city are rather steep floored and at the city there is a decided decrease in the fall of the stream with a widening of the valley. The unfortunate condition is still further accentuated by several railroad grades and wagon roads across the flood plain in the western part of the city. These grades were built in part to keep the traffic up and out of the water and in part to make easy grades for trains getting in and out of the valley. They do not have enough bridge section but are solid earth and stone walls nearly all the distance across the valley and hence obstruct greatly the ready egress of the water poured out upon the flats from the steeper upper stream courses.

The flood of 1913* proved the most destructive in the history of the city, and made it very plain that measures should speedily be taken to provide for this variable geographic factor—the river flood stage. Among necessary improvements

*Griggs, Julian, *Engineering News*, April, 1913.

are the rebuilding of the various grades so that they shall offer as little obstruction as possible, the straightening of the river channel in two large curves in the south part of town, the removal of encroaching buildings and bridge abutments at several points, together with more careful levee building. Much of this work would lend itself to the general scheme of city beautification.

FUTURE OF THE DISTRICT.

The general directions along which adjustments to geographic conditions in the area shall move, are already clearly indicated by present progress. There is no reason to believe that material change in the industrial or commercial tendencies will be called for by the environment. Relative values however, may change considerably. Because of the soil, climate, and market conditions prevailing in the region the farm lands will be devoted to agriculture, except where needed for the growth of the towns. The diversification already begun will continue. Market gardening, and fruit growing will each seek out the most favorable places and conditions for their respective expansion, and they will greatly increase at the expense of general agriculture. This is because of the general call of increasing population for more intensive agriculture and a greater supply of products from a smaller area, and because of the particular call of the larger population through the local markets. Stock-raising for meat will increase for the same reason.

Minor Centers.—Small towns will yet spring up at many points within the area, partly as residence suburbs of Columbus and partly to care for the commercial and mercantile interests of communities becoming more densely populated. These latter will be mainly at intersection points of railroads or of railroads and electrics or even in some places at improved road intersections.

Probably nothing new in the development of mineral resources will come to this district; but several industries now in their early and unimportant stages will greatly enlarge. Brick manufacturing has good opportunities, and it will yet grow much because of the abundance of shales, adjacent coal and gas, and the increasing demand for brick buildings. Stone quarrying, for crushed rock, cement and road material will become a larger industry; and quarrying for building stone may be more than

restored to its former significance as the desire in the city for more permanent buildings increases.

Manufacturing, along many lines, especially those catering to the local markets, will increase. New plants will arise at various points along the railroads and may form the nuclei for some of the new towns predicted above, but most of the factories will cling to the borders of the city.

The City.—Columbus may be expected to expand industrially, commercially and artistically for many years to come. Industrially, many building sites along river and railroad will be occupied; and commercially, as the population and manufacturing increase, the facilities for communication and transportation must needs be augmented. No doubt new electric lines will yet be built, and certainly several steam lines will doubletrack to increase the external relations and connections of the city. Possibly a new railroad or two may yet be demanded to care for the products coming into and going out from this city.

While the industrial development of Columbus may be expected to be concentrated along the railroads, and to run in some places, miles into the country, the residence districts will as certainly be built up between railroads. This points definitely to three districts beside the tract north of town and east of the Olentangy, already discussed, which may look for great improvement and a rapidly growing population. One of these, and if geographic conditions are to count for much, the first to receive attention, is the beautiful well drained, easily reached, upland between the two large rivers. Already much progress has been made in the southern part of this tract but the farms north of Fifth Avenue in both Clinton and Perry Townships must pass from farming lands to town lots, streets, drives and school yards, and city car lines must reach out along the present roads.

The next most desirable district is between the Big Four tracks north from Columbus and the Pennsylvania track north-east, in the vicinity of Linden. One electric line connecting with Westerville already runs close to this tract; others will come. The farms in this section are now so valuable for residences that they are not profitable for farming and the response must soon come.

The third district lies south-west from the city beyond the cemeteries and between the Baltimore and Ohio railroad, and

the Big Four. Its gently rolling topography and its moderate slope eastward to the Scioto, insuring good drainage, added to the short distance from the manufacturing plants in the western part of the city and the pressure of population from the same parts, constitute the chief reasons for development of this section for residences.

Scarcely a city in Ohio excels Columbus in the matter of opportunities to beautify and adorn itself with parks, drives,



Fig. 17. Hayden Falls, three miles above the Storage Dam, which should be made available by good road connections with the city.
(Photo by C. R. Stauffer.)

shade and shrubbery. Two or three natural water-ways lead out of the city along which roads and walks could be constructed for recreation walks and drives. The most attractive of these is unquestionably the Scioto valley. A good automobile road now runs up the valley as far as the storage dam on one side, but there might be a grassed strip with shade, rest benches, and flowering shrubs from the business district along the valley westward, then northward past Marble Cliff, the quarries and the dam and then along the water supply reservoir a considerable distance or even to its upper end. Grass, shade, comfort stations, and seats along

the lake shore would make a most attractive walk or drive all the way from the dusty city to the storage reservoir, any part or all of which could be used for a walk, by the thousands who at present seek outdoor exercise on dirty old roads. A return drive less elaborate could be made on the west side of the lake and river past Hayden's Falls (Fig. 17) coming into the city along West Broad Street. Golf grounds, the Wyandotte Club, Country Club and the Columbus Fishing and Gun Club are already along this route, and there might well be an amusement

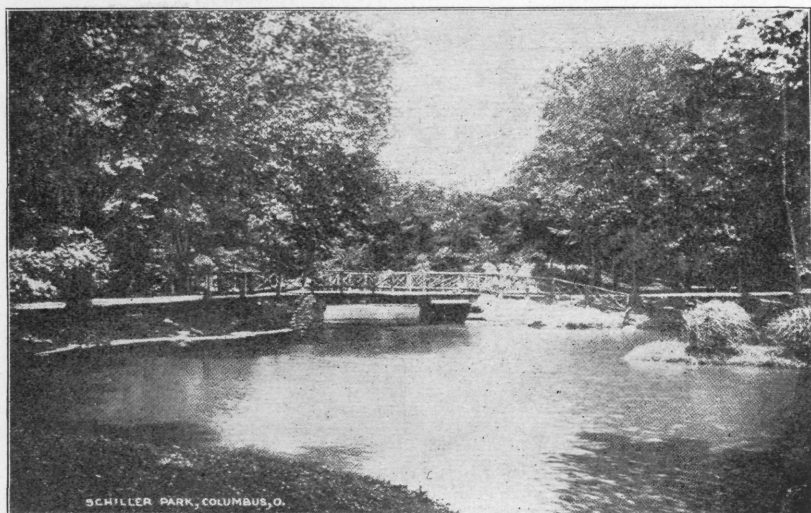


Fig. 18. A pool, with shady walks, drive and picnic grounds in Schiller Park.

park somewhere well out, perhaps on a part of the large terrace a little above the dam but approached by a car line from the city.

Similar shaded walks and drives with comfortable seats, attractive shrubbery and tree clusters at suitable points, constructed up the Olentangy valley from Fifth Avenue or even Goodale Street, past the State University and the Olentangy amusement park to Worthington, would constitute a delightful place, and would fit admirably into a naturally beautiful setting. This walk would of necessity require an artificial levee part of the way, until beyond the city limits.

From Franklin Park northward, up Alum Creek to Minerva Park, about eight miles, are many beautiful places which could be similarly tied together by a broad boulevard and shady walks. A cross line up a shady ravine, east of Linden, through that suburb and down another ravine, or through Clintonville to the Olentangy drive, or still further north from Minerva Park to Worthington, would complete the northern loop.

A loop is invited in the southeast part of the city from Franklin Park down Alum Creek, past the Driving Park and Infirmary and return to the Scioto Valley, through Schiller Park (Fig. 18) about two miles south of the State House.

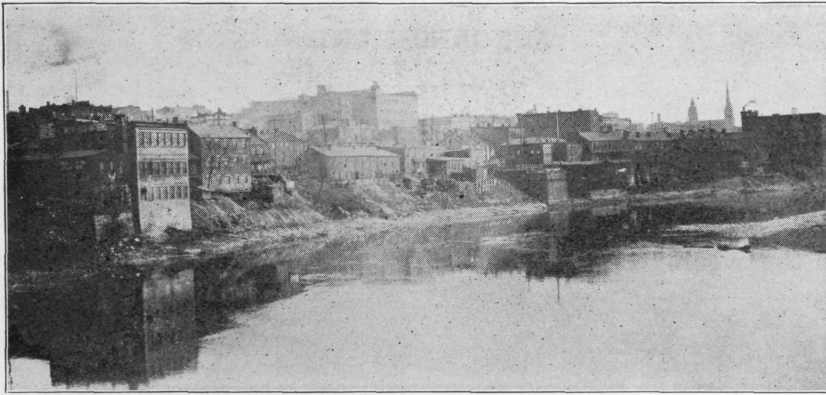


Fig. 19. The ancient ill-kept residences and old shops along the Scioto banks which should be removed to make place for a public drive, bordered with grass and shade. (Photo by R. F. Griggs.)

Instead of the unsightly, ancient, tumbled-down, unsanitary houses and shops now crowded along the river (Fig. 19) from Broad Street south, a broad, shady drive or walk on a large levee could be built, which would devote natural scenic beauty to the uses for which it is best adapted, and not strain it beyond recognition to make sites for hovels of squalor. The people living along these alleys would be vastly better off, too, if forced to find more cleanly, homelike quarters in real residence sections.

Of course not all this forecast can come true at once, any more than the present city with its maze of geographic adjustments has arisen in a year. But the progress of the century

gone suggests that another century should see most of the mentioned opportunities taken advantage of, both in city and country. With the progress of civilization, culture and industrial development will come closer adjustment to the geographic conditions. More items in the environment will be used, and a larger proportion will be used for the things to which they are best adapted.

Oberlin College, Oberlin, Ohio.

ANNOUNCEMENT.

The 27th Annual Meeting of the Ohio Academy of Science will be held in the Botany-Zoology Building at Ohio State University, Columbus, on April 6th and 7th. There will be an informal meeting of incoming members at the Ohio Union on the evening of April 5th.